

JC923 U.S. PTO  
11/29/01

Please type a plus sign (+) inside this box → ☐

PTO/SB/05 (03-01)  
Approved for use through 10/31/2002. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

First Inventor

Si-Nin-Quan

Title

revolutionary connections  
for spark plugs and wires

Express Mail Label No.

## APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
  2. ☐ Applicant claims small entity status.  
See 37 CFR 1.27.
  3. ☒ Specification [Total Pages (preferred arrangement set forth below)
    - Descriptive title of the invention
    - Cross Reference to Related Applications
    - Statement Regarding Fed sponsored R & D
    - Reference to sequence listing, a table, or a computer program listing appendix
    - Background of the Invention
    - Brief Summary of the Invention
    - Brief Description of the Drawings (if filed)
    - Detailed Description
    - Claim(s)
    - Abstract of the Disclosure
  4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets   - 5. Oath or Declaration [Total Pages   - a. ☐ Newly executed (original or copy)
  - b. ☐ Copy from a prior application (37 CFR 1.63 (d))  
(for continuation/divisional with Box 18 completed)
  - i. ☐ **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

## ADDRESS TO:

Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
  - a. ☐ Computer Readable Form (CRF)
  - b. Specification Sequence Listing on:
    - i. ☐ CD-ROM or CD-R (2 copies); or
    - ii. ☐ paper
  - c. ☐ Statements verifying identity of above copies

## ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☐ Power of Attorney
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. ☐ Other: .....

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No.: .....

Prior application information:

Examiner

Group Art Unit:

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

## 19. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒

Correspondence address below

Name

Si-Nin Quan

3186 Yakima circle

Address

City

San Jose

State

CA

Zip Code

95121

Country

U.S.A.

Telephone

408-226-4907

Fax

226-4907

Name (Print/Type)

Si-Nin Quan

Registration No. (Attorney/Agent)

Signature

*Si-Nin Quan*

Date

Nov 23, 2001

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

11017 U.S. PTO  
09/995872

11/29/01

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**FEE TRANSMITTAL**  
**for FY 2002**

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27**TOTAL AMOUNT OF PAYMENT** (\$ ) 740.00**Complete if Known**

Application Number

Filing Date

First Named Inventor

Examiner Name

Group Art Unit

Attorney Docket No.

**METHOD OF PAYMENT (check all that apply)**☐ Check ☒ Credit card ☐ Money Order ☐ Other ☐ None☐ Deposit Account:Deposit  
Account  
Number  
Deposit  
Account  
Name  

The Commissioner is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Credit any overpayments☒ Charge any additional fee(s) during the pendency of this application☐ Charge fee(s) indicated below, except for the filing fee  
to the above-identified deposit account.**FEE CALCULATION****1. BASIC FILING FEE**

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
101	740	201	370	Utility filing fee	740
106	330	206	165	Design filing fee	
107	510	207	255	Plant filing fee	
108	740	208	370	Reissue filing fee	
114	160	214	80	Provisional filing fee	

**SUBTOTAL (1)** (\$ ) 740**2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE**

	Extra Claims	Fee from below	Fee Paid
Total Claims	-20** =	X	
Independent Claims	-3** =	X	
Multiple Dependent			

Large Entity		Small Entity		Fee Description
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
103	18	203	9	Claims in excess of 20
102	84	202	42	Independent claims in excess of 3
104	280	204	140	Multiple dependent claim, if not paid
109	84	209	42	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

**SUBTOTAL (2)** (\$ )

\*\*or number previously paid, if greater; For Reissues, see above

**FEE CALCULATION (continued)****3. ADDITIONAL FEES**

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for ex parte reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	920	217	460	Extension for reply within third month	
118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	
121	280	221	140	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
143	460	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17(q)	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) \_\_\_\_\_

\*Reduced by Basic Filing Fee Paid

**SUBTOTAL (3)** (\$ )**SUBMITTED BY**

Name (Print/Type)	Si-Nin Quan	Registration No. (Attorney/Agent)		Telephone	408-226-4907
Signature	<i>Si-Nin Quan</i>			Date	Nov 23, 2001

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

PATENT APPLICATION OF

Si-Nin Quan

Judy, Fei-Man Quan

San Jose, CA

for

TITLE: REVOLUTIONARY CONNECTIONS FOR SPARK PLUGS  
AND SPARK PLUG WIRES

Form SB/08A---Information disclosure statement by applicant is  
attached hereto, disclosing relevant prior-art references.

FEDERALLY SPONSORED RESEARCH

Not Applicable

SEQUENCE LISTING OR PROGRAM

Not Applicable

BACKGROUND OF THE INVENTION

This invention relates to secondary ignition system for internal  
combustion engines, specifically to an improved positive locking  
function and easy removal for conventional spark plugs and spark  
plug:wires connections.

Variety of connections have been used in spark plugs and plug wires couplings, the most popular style is click-in, push to connect and pull to disconnect. Push to connect will create confusion sometimes whether said connections are secured or just being snug? Bench test reveals free spinning of components from said connections even though they are tight and secured. Self-separation occurs occasionally due to aging, repeated services, thermal cycles, vibration and high voltage conduction. If said self-separation should happen, it will cause pollution, poor performance and possibly internal engine damage. Pull to disconnect is another negative factor, when pulling is exercised, there is tendency of tearing components apart, rubber boot being torn possibly damaging the core in the plug wire, misfire would happen. In addition to surrounding high temperature, confined space, service personnel always have to face frustration, struggle or even minor bodily injuries in the field of servicing said connections. Numerous prior arts offered remedies, particularly U.S.PAT.no.(5,332,394), Frost Jul., 1994 and U.S.PAT.no.(4,810,198), Sturdevan Mar., 1989. Since all connections are couplers, concentrating upon one end will not reach ultimacy, the essence of my invention is synchronizing the other end which is the spark plug tip, an all-time solution.

#### SUMMARY

The invention will bring maintenance, services and repairs to a new boundary by providing simple, effortless procedure for servicing spark plugs and plug wires connections. The positive locking feature ensures an EPA issue-nonmisfiring, the self-pop-up released feature is a phenomenon to all related service personnel.

#### DRAWINGS

##### Drawing figures

Fig 1 shows conventional spark plug.

Fig 2 shows new configuration of spark plug tip.

Fig 3 shows top view of trust washer with inside diameter  $\pm 6\text{mm}$ , outside diameter  $\pm 9\text{mm}$ , due to various spark plug tip design, inside diameter should be recalibrated to fit individual application.

Fig 4 shows compressible spring with free height  $\pm 14\text{mm}$ , outside diameter  $\pm 9\text{mm}$ .

Fig 5 shows spark plug tip with built-in slot-pins  $\pm 9\text{mm}$  in length.

Fig 5A shows top view of spark plug tip with built-in slot-pins.

Fig 6 shows new configuration of spark plug tip after assembly.

Fig 7 shows conventional plug wire with stationary rubber boot.

Fig 7A shows built-in metal clip 14, rubber boot not shown.

Figs 8-8A show front and rear views of new embodiment with predetermined slots and omission of metal clip 14.

Fig 8B shows top view of Figs 8 and 8A.

Fig 9 shows adaptor for modified spark plug tip and conventional spark plug wire, an alternative embodiment.

Fig 10 shows new configuration after assembly, a preferred embodiment.

Fig 11 shows adaptor for modified spark plug tip and conventional spark plug wire metal clamp, an alternative embodiment.

#### REFERENCE NUMERALS IN DRAWINGS

10	built-in slot-pins	12	thrust washer
14	metal clip	16	metal clamp
18	rubber boot	20	plug wire (partial)
22	built-in slots	24	adaptor

#### DETAILED DESCRIPTION

##### Preferred embodiment

Drill a predetermined hole through upper portion of a conventional spark plug tip, install compressible spring over plug tip, put thrust washer on top of said spring, insert a predetermined slot-pin or cotter-pin through the hole to hold said washer and spring in place. The said assemblage can also be put together with built-in slot-pins in manufacturing process of spark plugs.

The spring clip in conventional plug wire metal clamp will be omitted, predetermined slots are built in metal clamp, recommend

material for modified metal clamps be superior than existing counterpart. Rubber boot will be made to slide along plug wire instead of stationary, same modification can be applied to Hemi style long-reached plug wire and Distributorless individual ignition coil design.

#### Alternative embodiment

An adaptor can be built with conventional plug tip at one end, which will fit conventional plug wire metal clamp, while the other end with predetermined slots will fit in spring-loaded plug tip. The advantage here is no modification needed for conventional plug wires, but non locking character still exists.

#### OPERATION

The invention provides simple steps to connect and disconnect spark plug wires from spark plugs. For removal, slide rubber boot 18(Fig 7) upward to expose enough metal clamp of plug wire 20(Fig 8) press said metal clamp down, turn counter clockwise to release, since plug tip is spring-loaded, said metal clamp will be pushed out after it clears the slot-pins. Compare to what mechanics are doing these days like twisting, pulling and yanking, this self-pop-up is a phenomenon. For installation, hold said metal clamp against matching slot-pins ( can be felt easily ),once metal clamp clears said slot-pins, press down and turn clockwise to lock, the spring will urge upon said metal clamp, forming a positive locking position, slide down said rubber boot firmly. With conventional snap and pull connections, even experienced mechanic can't be certain said connections are secured or just being snug, now they are black and white!

## CLAIMS

We claim:

1. A connection of the type comprising a modified spark plug tip and a modified spark plug wire metal clamp, the improvement wherein said connection has positive lock and easy disconnection features.
2. The connection of claim 1 wherein said spark plug tip has predetermined pins to which metal clamp of said spark plug wire can hook on.
3. The spark plug tip of claim 2 wherein has predetermined spacer and flexible means which are positioned by said pins.
4. The connection of claim 1 wherein said spark plug wire has predetermined slots built-in metal clamp.
5. The metal clamp of claim 4 wherein has sliding rubber boot.
6. A connection of the type comprising a modified spark plug tip and a modified spark plug wire metal clamp, characterized in easy junction.
7. The connection of claim 6 wherein said spark plug tip has predetermined dowels to which metal clamp of said spark plug wire can hook on.
8. The spark plug tip of claim 7 wherein has predetermined washer and compressible means which are held down by said dowels.
9. The junction of claim 6 wherein said spark plug wire metal clamp has predetermined grooves.
10. The metal clamp of claim 9 wherein has movable rubber boot.

REVOLUTIONARY CONNECTIONS FOR SPARK PLUGS  
AND SPARK PLUG WIRES

ABSTRACT

With two features of positive lock and self-pop-up, the invention provides simple procedure for connecting and disconnecting spark plugs and spark plug wires, a union of prevention and insurer.

1/4

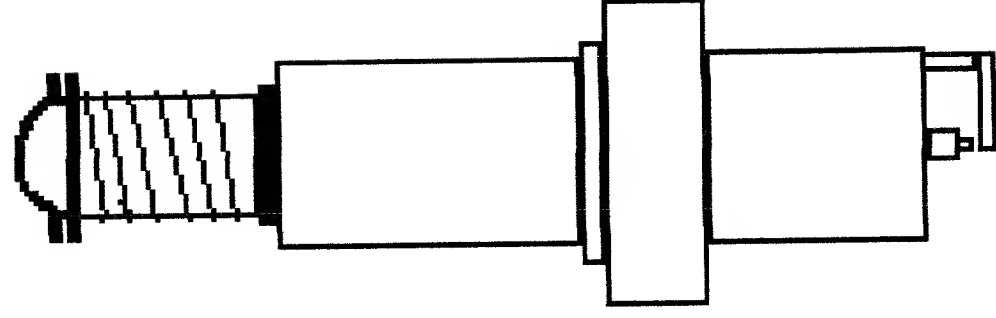


FIG. 1

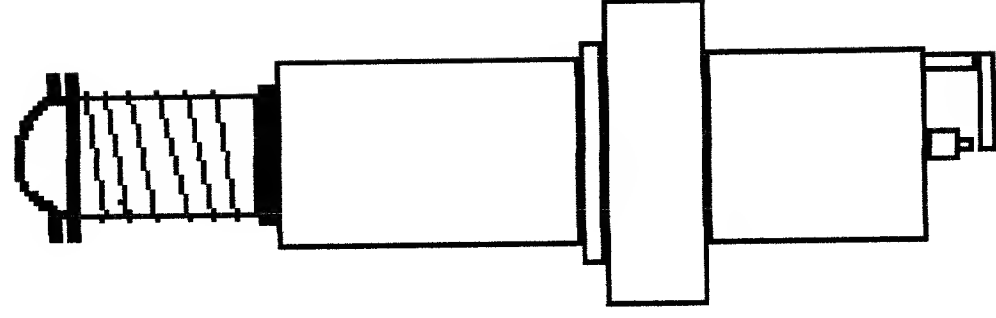


FIG. 2

Z/4

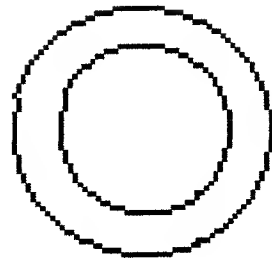


FIG. 3

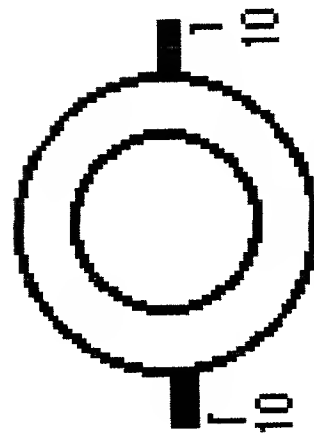


FIG. 5A

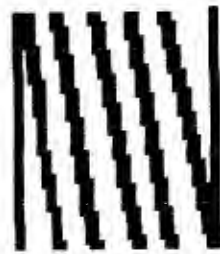


FIG. 4

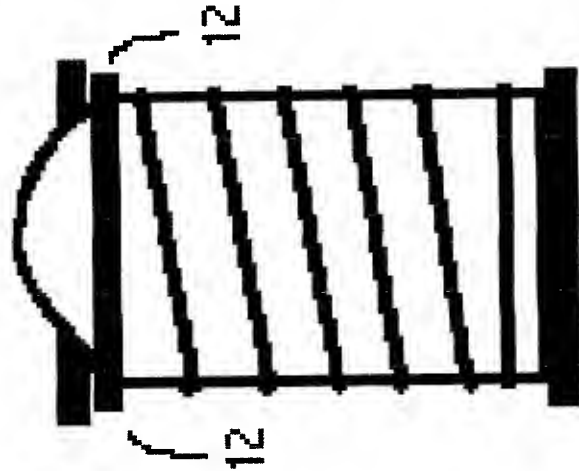


FIG. 6

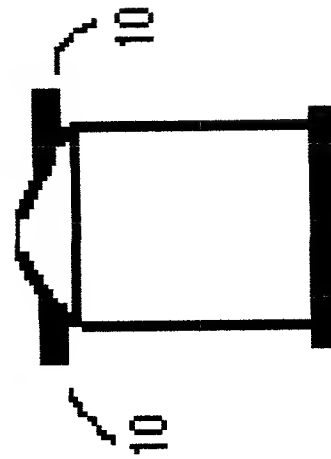


FIG. 5

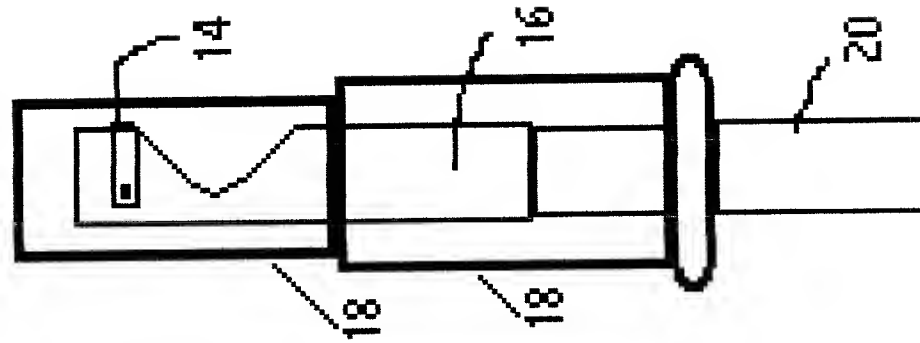


FIG. 7

Z

3/4

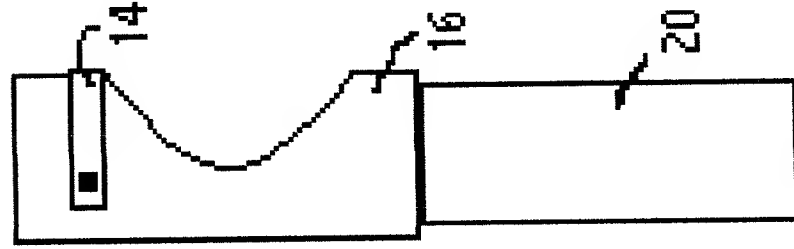


FIG. 7A

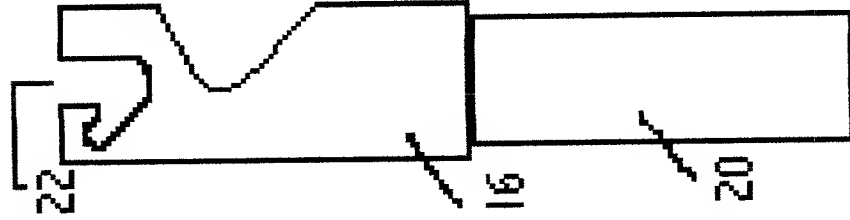


FIG. 8A

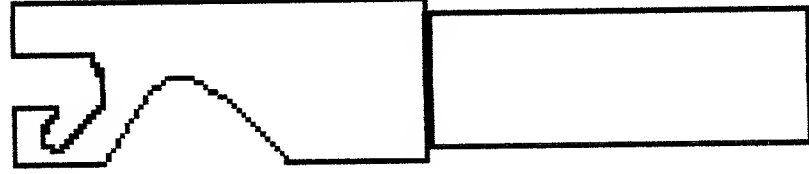


FIG. 8B

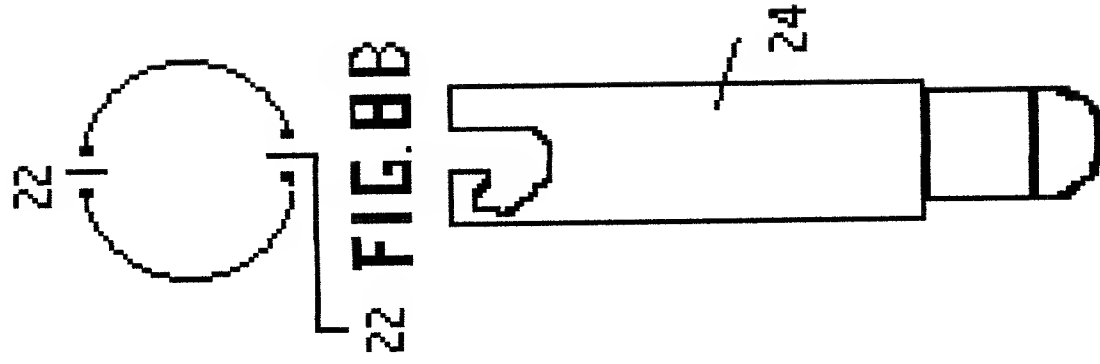


FIG. 9

4/4

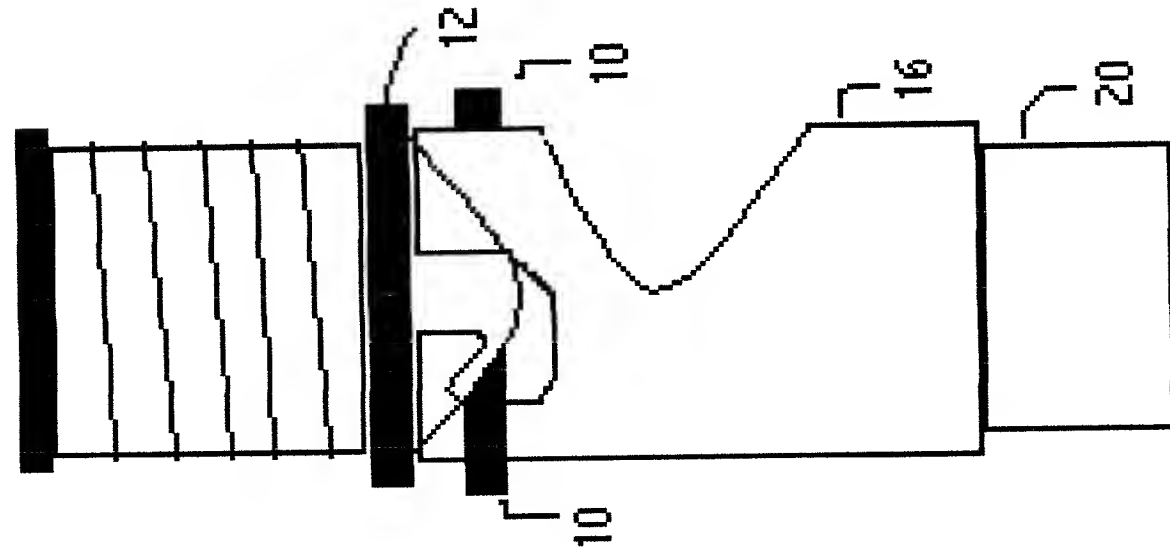


FIG. 10

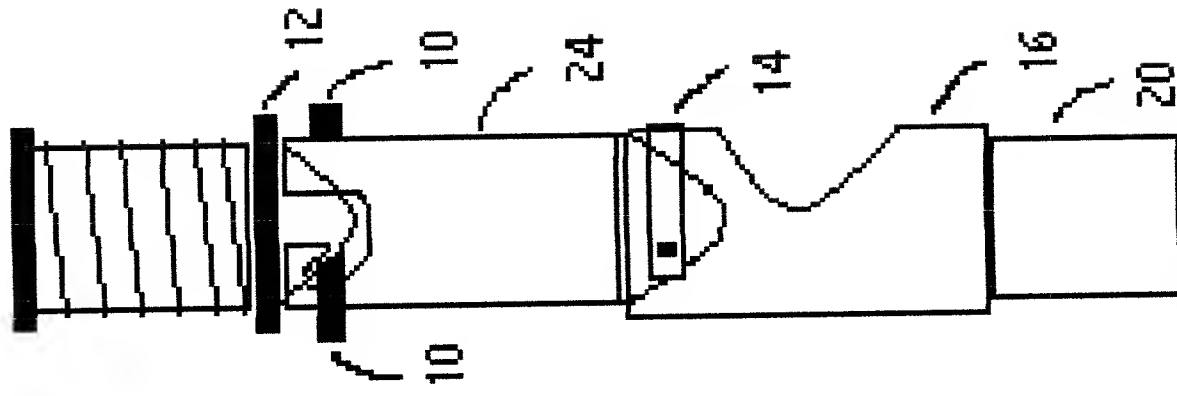


FIG. 11

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

**DECLARATION FOR UTILITY OR  
DESIGN  
PATENT APPLICATION  
(37 CFR 1.63)**

☒ Declaration Submitted with Initial Filing      OR      ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number

First Named Inventor

**COMPLETE IF KNOWN**

Application Number

Filing Date

Art Unit

Examiner Name

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Revolutionary connections for spark plugs  
and spark plug wires

(Title of the Invention)

the specification of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY)  as United States Application Number or PCT InternationalApplication Number  and was amended on (MM/DD/YYYY)  (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

T06371 2250660

## DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☐ Customer Number  OR ☒ Correspondence address below

Name **Si-Nin Quan**

Address **3186 Yakima circle**

City **San Jose**

State **CA**

ZIP **95121-2433**

Country **U.S.A.**

Telephone **408-226-4907**

Fax **226-4907**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR : ☒ A petition has been filed for this unsigned inventor

Given Name  
(first and middle [if any]) **Si-Nin**

Family Name  
or Surname **Quan**

Inventor's  
Signature



Date **Nov23, 2001**

Residence: City **San Jose**

State **CA**

Country **U.S.A.**

Citizenship **U.S.**

Mailing Address **3186 Yakima circle**

City **San Jose**

State **CA**

ZIP **95121**

Country **U.S.A.**

NAME OF SECOND INVENTOR: ☒ A petition has been filed for this unsigned inventor

Given Name  
(first and middle [if any]) **Judy, Fei-Man**

Family Name  
or Surname **Quan**

Inventor's  
Signature



Date **Nov 23, 2001**

Residence: City **San Jose**

State **CA**

Country **U.S.A.**

Citizenship **U.S.**

Mailing Address **3186 Yakima circle**

City **San Jose**

State **CA**

ZIP **95121**

Country **U.S.A.**

☐ Additional inventors are being named on the \_\_\_\_\_ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.